REMARKS

Claims 1 and 11 have each been amended to replace the terminology "composite oxide thereof" with the terminology "alumina-titania, alumina-zirconia, or titania-zirconia". This amendment is supported by the description on page 10, lines 16 to 17, of the specification of the present application.

The amendment to claims 1 and 11 excludes zeolite from the composite oxides and thereby clarifies the Office's misunderstanding. Since the amendment to claims 1 and 11 merely clarifies the language of the claims, the amendment does not raise new issues that would require further search. Therefore, the amendment to the claims should be entered.

Claims 1-5 and 7-14 are rejected under 35 U.S.C. §103(a) as being unpatentable over Nomura et al. (U.S. Patent No. 5,174,111; hereinafter: "Nomura") in view of Leyrer et al. (U.S. Patent No. 5,643,542; hereinafter "Leyrer") and further in view of Schmidt (U.S. Patent No. 3,986,350; hereinafter "Schmidt"). Claim 6 is rejected under 35 U.S.C. §103(a) as being unpatentable over Nomura in view of Leyrer and legal precedent as applied to claim 1, and further in view of official notice.

Reconsideration and removal of the 35 U.S.C. § 103(a) rejections are respectfully requested for the reasons explained below.

Claims 1 and 11

(I) Feature (i)

Claims 1 and 11 have the following feature (i):

A process for purifying exhaust gas from a gasoline engine of a fuel-direct-injection type,

wherein the process uses an exhaust gas purifying catalyst that contains a noble metal and a fire-resistant inorganic oxide (alumina, titania, zirconia, alumina-titania, alumina-zirconia, or titania-zirconia) carrying the noble metal, and is capable of purifying the first exhaust gas emitted under operation conditions of ideal air-to-fuel ratio (high output and high load conditions),

wherein the process also uses the exhaust gas purifying catalyst to purify second exhaust gas that forms a more oxidizing atmosphere at an air-to-fuel ratio exceeding 15 (under low load conditions, fuel saving), as compared with the first exhaust gas state, and

wherein the process purifies the second exhaust gas by controlling the second exhaust gas state such that the second

exhaust gas state has a relatively low exhaust-gas temperature at the inlet of the catalyst.

Using the exhaust gas purifying catalyst to purify both the first exhaust gas and second exhaust gas is advantageous in simplifying the purification process under all operation conditions.

In other words, the gasoline engine of a fuel-direct-injection type, which allows the temperature of exhaust gas to be easily controlled to remain at a low temperature, can be used in a second exhaust state in which the air-to-fuel ratio is set above 15 for better fuel economy, enabling the temperature of the second exhaust gas to be controlled to no greater than 500°C, preferably no greater than 350°C, and more preferably no greater than 300°C at the inlet of the catalyst.

That is, the exhaust gas purifying catalyst containing a noble metal can be used to purify exhaust gas in the second exhaust gas state, in addition to purifying exhaust gas in the first exhaust gas state in which the air-to-fuel ratio is set to an ideal ratio of 14.7.

(II) Distinctions over Cited References

(A) Nomura

(1) Fire-resistant inorganic oxide

The Office contends that Nomura discloses the fire-resistant inorganic oxide (alumina, titania, zirconia, or a composite oxide thereof) recited in current claims 1 and 11 of the present invention.

However, applicants maintain their position from the previous response that Nomura merely describes zeolite as a fire-resistant inorganic oxide (please see Abstract and claim 1 of the reference; no description can be found in Examples), and does not disclose anything about the fire-resistant inorganic oxides of the present invention, including alumina, titania, zirconia, and a composite oxide thereof as now clearly recited in the claims.

(2) Exhaust gas process

In order to purify NO_x in the HC atmosphere of the exhaust gas, Nomura controls HC in the exhaust gas by controlling the engine. The engine is controlled such that A/F (air-to-fuel ratio) is set to 19 to 20.

The engine used in Nomura is not of a direct-injection type. The exhaust gas purifying catalyst used in Nomura uses zeolite as a carrier, and transition metal and noble metal are supported on the carrier.

Namely, in ordinary lean-burn engines, Nomura varies the amount of HC by controlling the amount of fuel, and in order to

purify NO_X, Nomura uses zeolite that carries transition metal and noble metal.

In contrast, in the present invention, fuel is directly injected into cylinders of the engine. This enables the same catalyst to process both the first exhaust state and the second exhaust state which is controlled to have a lower exhaust gas temperature than that in the first exhaust gas state.

A catalyst in which Cu is supported on zeolite is described in Comparative Examples in the specification of the present application and resembles the catalyst of Nomura. As described in the response to the previous Action, the catalyst in which Cu is supported on zeolite is not effective for the purification of exhaust gas in either the first or second exhaust gas states as recited in the present claims.

(B) Leyrer

Applicants submit that Leyrer neither discloses nor suggests the feature (i) of the present invention.

The invention as taught by Leyrer relates to a three-way catalyst. Specifically, Leyrer concerns purification of exhaust gas in which A/F = 14.7 ± 0.2, and in which fluctuation occurs between a reduction atmosphere (high HC and CO level) and an oxidation atmosphere (high NO_X and O_2 level).

As such, the exhaust gas state in which the A/F exceeds 15 as claimed in the present invention is outside the scope of Leyrer (please refer to the background art section of Leyrer).

Further, in Leyrer, exhaust gas is purified with an exhaust gas purifying catalyst in which silica alumina is used as a carrier, and in which a noble metal is supported on the surface of the carrier. This is clearly different from the present invention.

C) Combination of the references

Combining Nomura and Leyrer at best realizes a purification process in which exhaust gas of a lean-burn engine is purified by controlling a fuel amount and varying the amount of HC in the exhaust gas, using silica alumina supporting noble metal on its surface.

In the present invention exhaust gas is purified using the same exhaust gas purifying catalyst in both a first exhaust gas state (A/F = 13 to 15) and a second exhaust gas state (A/F > 15) in a gasoline engine of a fuel-direct-injection type. The Office has not shown where the combination of Nomura and Leyrer provides the necessary motive required under 35 U.S.C. § 103(a) to a person of ordinary skill in the art to modify Nomura as required to obtain the process of the present invention.

Thus, the combination of Nomura and Leyrer does not support a case of prima facie obviousness of claims 1 and 11 (and the claims dependent thereon) under 35 U.S.C. § 103(a), and these claims satisfy the requirement of patentability.

Removal of the 35 U.S.C. § 103(a) rejections is believed to be in order and is respectfully solicited.

The foregoing is believed to be a complete and proper response to the Office Action dated August 8, 2005, and is believed to place this application in condition for allowance. If, however, minor issues remain that can be resolved by means of a telephone interview, the Examiner is respectfully requested to contact the undersigned attorney at the telephone number indicated below.

In the event that this paper is not considered to be timely filed, applicants hereby petition for an appropriate extension of time. The fee for any such extension may be charged to our Deposit Account No. 111833.

In the event any additional fees are required, please also charge our Deposit Account No. 111833.

Respectfully submitted,

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